Ramki Gummadi

Contact Information

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Interests

Inference and learning, Stochastic Systems, Bayesian Methods, Optimization and Control, Information Theory and Erasure Codes, Mechanism Design, Health Care markets.

Current Position:

Stanford University
Postdoctoral Researcher, Information, Decisions and Algorithms (IDEAL) Group.
Mentors: Prof. Ramesh Johari (MS&E) and Prof. Mohsen Bayati (Graduate School of Business).
Highlights of research contributions include (1) dynamics of interacting multiarmed bandit processes under a mean field limit and (2) Explicit characterization of approximately optimal principal-agent contracts for a class of jointly Gaussian utility models inspired by health care market applications.

Education

- **University of Illinois at Urbana Champaign**
  Ph.D. in Electrical and Computer Engineering. December 2011
  Dissertation: *Coding and Scheduling in Networks for Erasures and Broadcast*
  Advisor: Prof. RS. Sreenivas (Industrial Systems Engineering)
- **Indian Institute of Technology Madras**
  B.Tech. in Electrical Engineering. May 2005

Work Experience

- *Insight Data Science Fellow and Consultant for AnalyticsMD, Palo Alto, CA.* Summer 2013
  Worked with time series data on patient loads and built short term forecasting software to optimize hospital staffing.
- *Networks, Economics and Algorithms Group, Microsoft Research.* Oct - Dec, 2010
  Characterized and implemented optimal bidding strategies in repeated auctions under expense constraints using a stochastic control framework.
- *Math of Networks and Complex Systems Group, Bell Labs, NJ.* May-Aug, 2010
  Explored and implemented approaches to Dynamic Spectrum Management based on ideas from Disjunctive Programming.
- *Laboratory for Algorithms (ALGO), EPFL, Lausanne, Switzerland.* Jun-Aug, 2009
  Designed and implemented a Raptor code that improved the error floor for binary symmetric channels.
- *Technicolor Corporate Research Lab, Paris, France.* Feb-Jun, 2009
  Studied the limits of network coding for wireless unicast, with a focus on feedback signaling constraints.

Software tools

Python, C++, Matlab, R, SQL, Git, LaTex.

Other Professional Experience

- Instructor, "C++ Bootcamp", Financial Engineering Program, Summer 2011, UIUC.
- Teaching Assistant for ECE 490, Introduction to Optimization, Spring 2011, UIUC.
- Reviewer for Operations Research, IEEE Transactions on Automatic Control, IEEE/ACM Transactions on Networking, IEEE Transactions on Communications, IEEE Journal on Selected Areas in Communications (JSAC), IEEE International Symposium on Information Theory, Allerton Conference on Control, Communication and Computing.

Selected honors

- Frederick and Edith Mavis Fellowship Award from the UIUC College of engineering, 2009. ($5000 unrestricted cash award)
- Vodafone Graduate Fellowship, 2007-2008. ($45,000 covering tuition and stipend for the academic year)
- NSF award for participating in Stochastic Networks Workshop in Cambridge, U.K., March 2010 and to the INFORMS APS meeting in Stockholm, 2011 (withdrawn); Student Travel awards for INFOCOM, SIGCOMM and the Information Theory Society Summer School.

List of Publications

1. M. Bayati, M. Braverman, R. Gummadi, R. Johari, "Analysis of Pay for Performance Models in Healthcare", Working Draft available on request, October 2013.
2. R. Gummadi, R. Johari, J. Yu, "Mean Field Equilibria of Multi Armed Bandit Games", preliminary version appeared in *ACM Conference on Electronic Commerce (EC)*, 2012 and *Allerton Annual Conference on Communications, Control and Computing*, October 2012. Working draft available on SSRN.
3. R. Gummadi, P. Key, A. Proutieré, "Optimal Bidding Strategies and Equilibria in Repeated Auctions with budget constraints", preliminary versions appeared in *Allerton Annual Conference on Communications, Control and Computing*, September 2011 and in *Ad Auctions Workshop 2012*, Valencia, Spain. Working draft available on SSRN.
4. R. Gummadi, L. Massoulié, R. Sreenivas, "The Role of Feedback in the choice between routing and coding for wireless unicast", *Physical Communication, Special Issue on Wireless Network Coding (Elsevier)*, Vol 6, pp. 88-99, 2013. A preliminary version appeared in *Proceedings of IEEE International Symposium on Network Coding*, Toronto, June 2010.
5. R. Gummadi, R. Sreenivas, "Erasure Codes with Efficient Repair", *Preliminary version was accepted to the IEEE Information theory workshop*, 2011 (not presented at workshop due to visa issues). Draft available online.
6. R. Gummadi, R. Sreenivas, N. Singh, "On Tractable Instances of Modular Supervisory Control", *IEEE Transactions on Automatic Control*, Vol 56(7), pp. 1621-1635, August 2011.
7. R. Gummadi, A. Shokrollahi, R. Sreenivas, "Broadcasting with Side Information Using Fountain Codes", *Proceedings of IEEE Information Theory Workshop*, pp. 1-5, January 2010.
8. R. Gummadi, "Optimal Control of a Broadcasting Server", Preliminary version appeared in the *Proceedings of IEEE Conference on Decision and Control (CDC)*, pp. 2634-2639, December, 2009.
9. R. Gummadi, K. Jung, D. Shah, R. Sreenivas, "Computing Capacity of a Wireless Network", *Proceedings of IEEE International Conference on Computer Communications (INFOCOM)*, pp. 1341-1349, April 2009.
10. R. Gummadi, R. Sreenivas, "Relaying a Fountain Code across multiple Nodes", *Proceedings of IEEE Information Theory Workshop*, pp. 149-153, May, 2008. Also appeared as a poster at *SIGCOMM*, May 2008.

11. R. Gummadi, K. Jung, D. Shah, R. Sreenivas, "Feasible Rate Allocation in Wireless Networks", *Proceedings of IEEE International Conference on Computer Communications (INFOCOM)*, pp. 13-18, April 2008.

Graduate Course Work

Random Processes (A+), Information Theory (A+), Coding Theory (A+), Advanced Algorithms (A+), Distributed Network Algorithms (A+), Algorithmic Game Theory (A), Control System Theory and Design (A+), Communication Networks(A) and Analysis (A), Wireless Networks (A+), Combinatorial Mathematics (A), Probability theory 1(A), Probability theory 2 (A+).

Oral Presentations

- "Mean Field Equilibria of Multi Armed Bandit Games", ITA 2013 Graduation Day Poster Session, San Diego, Feb 2013; INFORMS 2012, Phoenix, AZ; ACM Conference on Electronic Commerce (ACM EC 2012), June 2012, Valencia, Spain; Technicolor Corporate Research Lab, Palo Alto, May 2012; IDEAL group seminar, May 2012, Stanford University.
- "Dynamic Auctions with budget constraints", INFORMS 2013 (invited); Google Research, April 2013; IDEAL group seminar, October 2011, Stanford University; Ad Auctions Workshop, June 2012, Valencia, Spain; International Symposium on Mathematical Programming (ISMP 2012), Aug 2012, Berlin, Germany.
- "Coding and Scheduling in Networks for Erasures and Broadcast", Ph.D. Defense, June 2011, Urbana, IL.
- "Optimal Power Allocation for Dynamic Spectrum Management", Aug 2010, Bell Labs, NJ.
- "Role of feedback in network coding for wireless unicast", Jun 2010, NETCOD, Toronto, Canada; Apr 2009, Thomson Lab Retreat, Grenoble, France.
- "Broadcasting with Side Information using fountain codes", Jan 2010, ITW, Cairo, Egypt.
- "Optimal Control of a Broadcasting Server", IEEE Conference on Decision and Control, Dec 2009, Shanghai, China.
- "Computing Capacity Region of a Wireless Network", Apr 2009, INFOCOM, Rio De Janeiro, Brazil.
- "Relaying a Fountain Code Across Multiple Nodes", May 2008, ITW, Porto, Portugal; Jun 2008, Information theory summer school, University Park, PA; Aug 2008, SIGCOMM poster session, Seattle, WA; Jan 2007, CSL student conference, UIUC, 2007.
- "Feasible Rate Allocation in Wireless Networks", Apr 2008, INFOCOM, Phoenix, AZ; Mar 2008, Systems and Networking Seminar, Dept of CS, UIUC; Sep 2007, Topics in Systems Seminar, CSL, UIUC.

References

- Ramesh Johari (Post-Doc advisor)
  Associate Professor, Management Science and Engineering, Stanford University.
  ramesh.johari@stanford.edu, WWW
- RS Sreenivas (Ph.D. advisor)
  Associate Professor, Industrial Systems Engineering, UIUC.
  rsree@illinois.edu, WWW
- Mohsen Bayati
  Assistant Professor, Graduate School of Business, Stanford University.
  bayati@stanford.edu, WWW
- Peter Key
  Director, Networks Economics and Algorithms Group, Microsoft Research, Cambridge, U.K.
  peter.key@microsoft.com, WWW

- P.R. Kumar
  Professor Emeritus of Electrical and Computer Engineering, UIUC.
  prkumar@illinois.edu, WWW
- Laurent Massoulié
  Director, Microsoft Research INRIA, Paris, France.
  laurent.massoulie@technicolor.com, WWW
- Alexandre Proutieré
  Associate Professor, KTH Royal Institute of Technology, Stockholm.
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- Amin Shokrollahi
  Professor, École Polytechnique Féderale de Lausanne.
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